

CS 475/575

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Project #6

OpenCL Linear Regression

1. What machine you ran this on

rabbit

2. the correct M and B values

DATASIZE is 4194304, LOCALSIZE is 256=> ** m = 5.01 b = 7.00 **

3. Show the table and graphs

DATASIZE	LOCALSIZE	MegaXYsProcessedPerSecond
4096	8	49.95
4096	32	37.49
4096	64	43.07
4096	128	56.07
4096	256	46.91
16384	8	153.18
16384	32	205.55
16384	64	153.7
16384	128	293.08
16384	256	278.24
65536	8	185.68
65536	32	228.63
65536	64	299.42
65536	128	200.49
65536	256	165.88
262144	8	420.42
262144	32	344.82
262144	64	323.07
262144	128	412.97
262144	256	382.43
1048576	8	1114.08
1048576	32	1545.23
1048576	64	1900.51
1048576	128	1701.79
1048576	256	1462.44
4194304	8	1995.47
4194304	32	3542.34
4194304	64	3986.23
4194304	128	3724.46
4194304	256	3572.09

	8	32	64	128	256
4096	49.95	37.49	43.07	56.07	46.91
16384	153.18	205.55	153.7	293.08	278.24
65536	185.68	228.63	299.42	200.49	165.88
262144	420.42	344.82	323.07	412.97	382.43
1048576	1114.08	1545.23	1900.51	1701.79	1462.44
4194304	1995.47	3542.34	3986.23	3724.46	3572.09

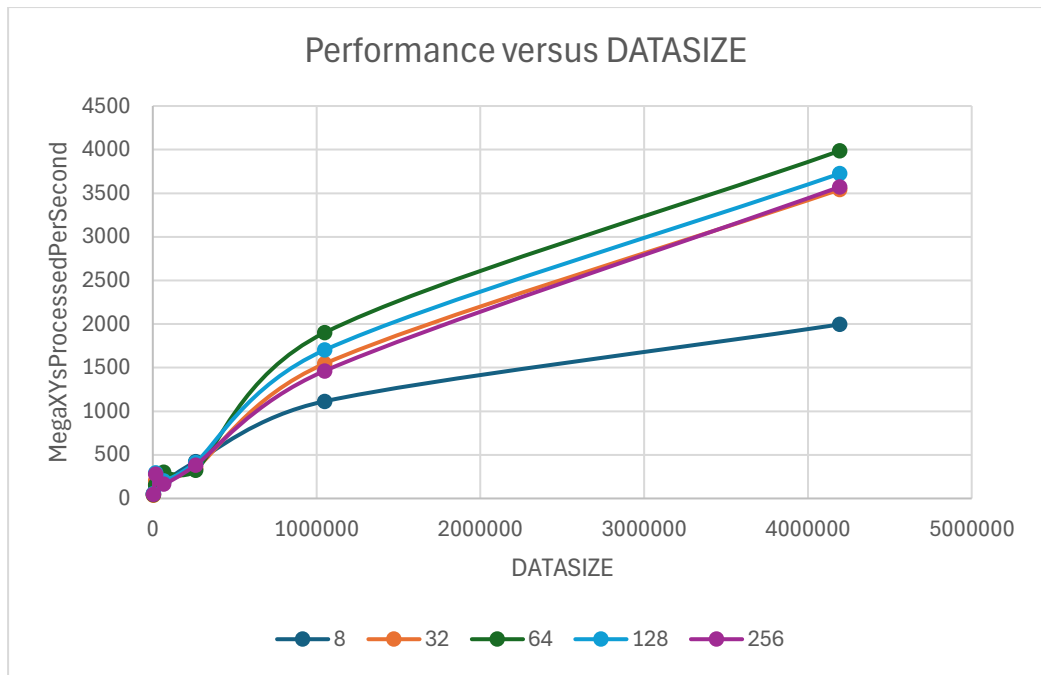


Figure1

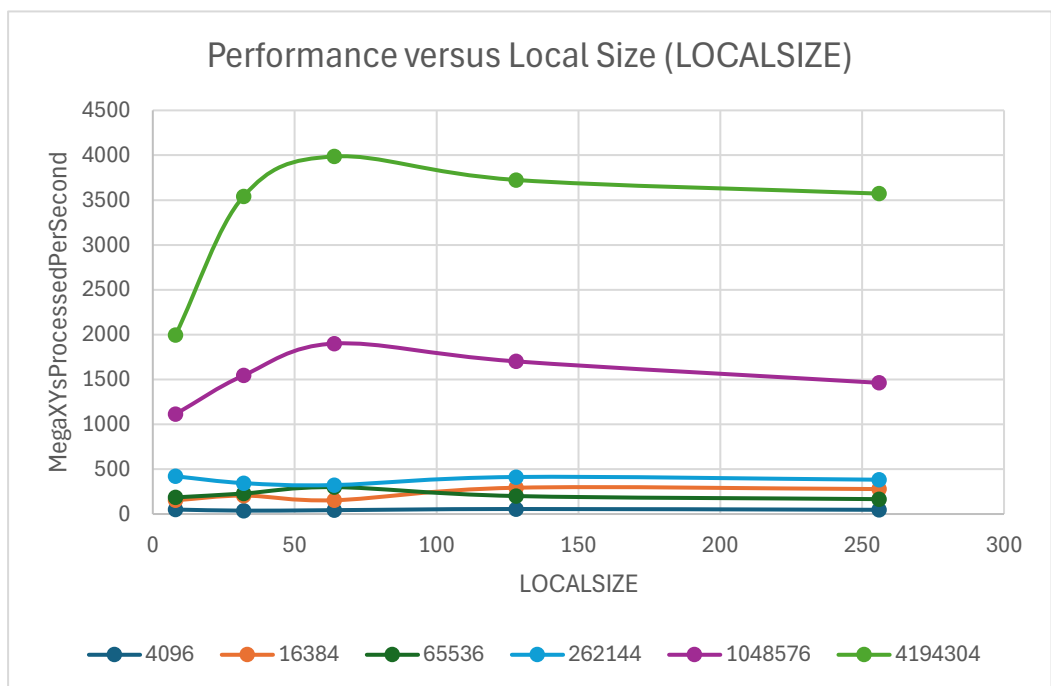


Figure2

4. What patterns are you seeing in the performance curves? What difference does the size of data make? What difference does the size of each work-group make?

In Figure 1, no matter what kind of LOCALSIZE, as DATASIZE increases, the performance shows an obvious upward trend. When LOCALSIZE is 8, performance increases the slowest. Performance increases faster with LOCALSIZE of 32, 64, 128, and 256, and in some cases, LOCALSIZE of 64 gives the best performance.

In Figure 2, DATASIZE 4194304 and 1048576 performance peaks when LOCALSIZE is 32, and then decreases slightly as LOCALSIZE increases. And it levels off after LOCALSIZE 128. The remaining data sizes (4096, 16384, 65536, 262144) have small performance changes under different LOCALSIZE, and the performance is relatively low.

As data size increases, performance usually increases significantly. This suggests that larger datasets make better use of computing resources, primarily due to better parallelization and more efficient use of memory and computing resources. For example: when the data size increases from 4096 to 4194304, the performance increases from 46.91 to 3572.09. When the data size is small (such as 4096), the performance is relatively low, which may be because the data set is small and the computing resources cannot be fully utilized.

Increasing the workgroup size initially can significantly improve performance. This may be since a larger number of workers allows for more parallel processing. However, above a certain workgroup size, performance gains are reduced or even slightly degraded.

5. Why do you think the patterns look this way?

As data size increases, more computing tasks can be divided and processed in parallel, resulting in better utilization of computing resources. For example, computations running on GPUs can process more blocks of data simultaneously, improving overall computing efficiency. When the matrix size is smaller, the performance is lower because the processing power of the GPU is not fully utilized. As the

matrix size increases, the GPU is used more efficiently due to reduced computational idle time, resulting in better performance.